

CLAIMS

1. Method for transmitting data between at least one transmitter and at least one receiver , in the form of packets of at least one data item, each of said data packets being associated with an identifier of said packet,

5 said receiver periodically sending a feedback message to said transmitter, comprising at least one bitmap block associated with a predetermined number of data packets having consecutive identifiers, so as to  
10 selectively inform said transmitter of a state of acknowledgement (acknowledged or unacknowledged) of each of said data packets of said block,

characterized in comprising at least one step of associating at least one timer with at least some of  
15 said bitmap blocks.

2. Data transmission method according to claim 1, characterized in comprising, for a given bitmap block, a first step of activating said timer, when said transmitter sends to said receiver the first of said  
20 data packets of consecutive identifiers associated with

said block, so that said timer switches to said activated state.

3. Data transmission method according to any of claims 1 and 2, characterized in comprising, for a given bitmap block, a first step of deactivating said timer after a predetermined maximum duration,

and in that said data packets of said block are then considered by said transmitter in said unacknowledged state.

10 4. Data transmission method according to any of claims 1 to 3, characterized in comprising, for a given bitmap block, a second step of deactivating said timer when said transmitter receives a cumulated acknowledgement of at least said data packets of said block, indicating that said data packets of said block are in said acknowledged state.

15 5. Data transmission method according to any of claims 1 to 4, characterized in comprising, for a given bitmap block, a third step of deactivating said timer, when said transmitter receives a feedback message comprising at least said bitmap block.

20 6. Data transmission method according to claim 5, characterized in that, when the transmitter receives said feedback message, a step of analysing said feedback message is implemented, so as to determine said acknowledged or unacknowledged state of each of said data packets of said block.

25 7. Data transmission method according to any of claims 3 to 6, characterized in that, at the end of one of said steps of deactivating said timer, at least one data packet of said block being in said unacknowledged

state, a step of positioning at least some unacknowledged data packets of said block in a retransmission queue is implemented.

8. Data transmission method according to any of  
5 claims 6 and 7, characterized in that, at the end of said analysis step, a step of checking the presence, in said retransmission queue, of at least one acknowledged data packet of said block is implemented,

and in that, when the presence in said queue of at  
10 least one acknowledged data packet of said block has been confirmed, a step of deleting said acknowledged data packet(s) of said block from said retransmission queue is implemented.

9. Data transmission method according to any of  
15 claims 7 and 8, characterized in that at least one step of retransmitting said data packet(s) of said block positioned in said retransmission queue is implemented,

and a second step of activating said timer of said  
block is implemented when the first of said data  
20 packets of said block positioned in said queue are retransmitted.

10. Data transmission method according to any of  
claims 1 to 9, characterized in that an ARQ (Automatic Repeat Request) type protocol is implemented.

25 11. Data transmission method according to any of claims 1 to 10, characterized in further comprising at least one time stamping step of associating a time stamp with at least some data packets in said unacknowledged state.

30 12. Data transmission method according to claim 11, characterized in that said time stamp is activated

when said transmitter sends said associated data packet.

13. Data transmission method according to any of claims 7 to 12, characterized in that said positioning  
5 step comprises a preliminary sub-step of selecting data packets to be positioned in said queue, depending on at least one predetermined selection criterion.

14. Data transmission method according to claim 12, characterized in that said selection criterion  
10 takes into account at least one item of the information belonging to the group composed of:

- the value of said time stamp associated with an unacknowledged data packet of said block;
- the ARQ class of said receiver.

15 15. Data transmission method according to any of claims 13 and 14, characterized in that said selection sub-step allows the selection of said unacknowledged data packet(s) of said block, associated with a time stamp having a value greater than or equal to said  
20 predetermined maximum duration.

16. Data transmission method according to any of claims 11 to 15, characterized in that said positioning step further comprises, for each of said selected data packets, a sub-step of deactivating said associated  
25 time stamp.

17. Data transmission method according to claims 9 and 13, characterized in that,

when all unacknowledged data packets of said block have been selected in said selection sub-step,

30 said timer takes the following value  $V(T)$  during said second activation step:

$$V(T) = t(\text{activation}) + d_{\max},$$

where  $t(\text{activation})$  is the current time value during said second activation step, and where  $d_{\max}$  is said predetermined maximum duration,

5 and in that

the timer associated with each data packet of the block positioned in said queue is activated and takes the current time value during said retransmission of said data packet.

10 18. Data transmission method according to any of claims 15 to 17, characterized in that, at the end of said first step of deactivating said timer,

if at least one unacknowledged data packet of said block, associated with a time stamp having a value of  
15 less than said predetermined maximum duration, has not been selected during said selection sub-step,

a third step of activating said timer of said block is implemented, so that said timer takes the following value  $V(T)$ :

20  $V(T) = V(\text{run}) + (\text{Time stamp}[i] - \text{Time stamp}[j])$ ,  
where  $V(\text{run})$  is the value of said timer during said step of said timer running in said deactivated state,

Time stamp[j] is the greater value of said time stamps associated with said unacknowledged data packets  
25 of said block selected during said selection sub-step,

and Time stamp[j] is the greater value of said time stamps associated with said unacknowledged data packets of said block not selected during said selection sub-step.

30 19. Data transmission method according to claim 6 and any of claims 11 to 18, characterized in that, at

the end of said step of analysing said feedback message, said method implements, for each of said acknowledged data packets of said block, a step of deactivating said associated time stamp.

- 5        20. Data transmission method according to any of claims 14 to 19, characterized in that, at the end of said third step of deactivating said timer,

10        if at least one unacknowledged data packet of said block has not been selected during said selection sub-step depending on a decision criterion related to the ARQ class of said receiver,

      a fourth step of activating said timer of said block is implemented, so that said timer takes the following value  $V(T)$ :

15        
$$V(T) = V(\text{run}) + (d_{\text{max}} - (t - \text{Time stamp}[i])),$$

      where  $V(\text{run})$  is the value of said timer during said step of said timer running in said deactivated state,

$d_{\text{max}}$  is said predetermined maximum duration,

20         $t$  is the current time value,

      and  $\text{Time stamp}[i]$  is the greater value of said time stamps associated with said unacknowledged data packets of said block not selected during said selection sub-step.

- 25        21. Transmitter for transmitting data to at least one receiver, in the form of packets of at least one data item, each of said data packets being associated with an identifier of said packet,

30        said receiver periodically sending a feedback message to said transmitter, comprising at least one bitmap block associated with a predetermined number of

data packets having consecutive identifiers, so as to selectively inform the transmitter of a state of acknowledgement (acknowledged or unacknowledged) of each of said data packets of said block,

5 characterized in that said transmitter comprises means for associating at least one timer with at least some of said bitmap blocks.

22. Receiver for data transmitted from at least one transmitter, in the form of packets of at least one  
10 data item, each of said data packets being associated with an identifier of said packet,

said receiver periodically sending a feedback message to said transmitter, comprising at least one bitmap block associated with a predetermined number of  
15 data packets having consecutive identifiers, so as to selectively inform the transmitter of a state of acknowledgement (acknowledged or unacknowledged) of each of said data packets of said block,

characterized in that it is implemented in the  
20 data transmission method according to any of claims 1 to 20.

23. System for transmitting data between at least one transmitter and at least one receiver, in the form of packets of at least one data item, each of said data  
25 packets being associated with an identifier of said packet,

said receiver periodically sending a feedback message to said transmitter, comprising at least one bitmap block associated with a predetermined number of  
30 data packets having consecutive identifiers, so as to selectively inform the transmitter of a state of

acknowledgement (acknowledged or unacknowledged) of  
each of said data packets of said block,

characterized in comprising means for associating  
at least one timer with at least some of said bitmap  
5 blocks.